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MUW-100, Columbus, MS 39701, and Tristan Denley, Austin Peay State University, 601 College
St., Clarksville, TN 37044. Modular-Distance Labelings of Graphs. Preliminary report.

In [5] Ferrara, Kohayakawa, and Rödl introduced a way to represent graphs using vertex labels and distances. Here we will consider a modification of this construction, which we shall call modular distance graphs. Let $V$ be a non-empty set, $\Phi : V \mapsto \mathbb{Z}^+$ be an injective function, and $D_m \subseteq \mathbb{Z}^+ \times P$ where $P$ is the set of prime integers. Then the modular distance graph $G(\Phi, D_m)$ is the graph with vertex set $V$ and edge set defined by $(u, v) \in E(G) \iff |\Phi(u) - \Phi(v)| \equiv a \pmod{p}$ for some $u, v \in V$ and $(a, p) \in D_m$.

We shall consider the parameter $D_m(G) = \min_{G(\Phi, D_m) \cong G} |D_m|$, showing that for any graph with maximum degree $\Delta$ $D_m(G) \leq \frac{1}{2}\Delta + (O(\Delta^{\frac{2}{3}} \log \Delta)^{\frac{1}{3}})$ and that there graphs for which $D_m(G) > \frac{5\Delta}{12}$. We also show that $D_m(G) \leq 20$ when $G$ is planar. (Received September 22, 2011)